Getting Started

Welcome to the MacBook Pro course.

Reviewing this course will enable you to efficiently troubleshoot and service MacBook Pro computers.

MacBook Pro computers present special challenges for service technicians.

We will review how you can best address these challenges.

In addition, we will offer guidance on best troubleshooting and repair practices.

Target Audience

This course is intended for technicians who support and service Apple products.

Prerequisite Courses

- Basic Computer Theory and Terms
- Underlying Technologies
- References
- Diagnostics
- Troubleshooting Theory
- ESD Precautions
- Hardware Tools
- Technician Safety
- Hardware Service Issues
- Liquid Crystal Displays
- Wireless Networking

Time Required

- 45 minutes

Course Objectives

Applicable to all models covered in this course:

- Given an isolated hardware device issue and a possible resolution, use Apple documentation, approved tools, and service inventory to safely repair the hardware device in 45 minutes.
- Using Apple technical documentation as a reference, remove and then replace a specified component of a given supported product in the time allocated for that repair procedure.
- Given a hardware service repair and the correct Apple technical documentation for a specified supported product, identify the service and safety issues for that product in 2 minutes.
- Given a hardware service repair and the correct Apple technical documentation for a specified supported product, identify specialized tools/fixtures or procedures required to service that product in 2 minutes.
- Use hardware service diagnostics to thoroughly verify that a given hardware service repair was completed correctly in 5 minutes.
- Reseat identified connectors to resolve a hardware issue on a given device before replacing any service parts on that device in 10 minutes.

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Next: MacBook Pro Overview

MacBook Pro Overview

- MacBook Models
- Documentation

MacBook Pro Models

The MacBook Pro series was introduced in January of 2006. It brought Intel-based processors to Apple's professional portable line.

The MacBook Pro series consists of the following models:

- MacBook Pro
- MacBook Pro (15-inch Core 2 Duo)
- MacBook Pro (15-inch 2.4/2.2GHz)
- MacBook Pro (17-inch)
- MacBook Pro (17-inch Core 2 Duo)
- MacBook Pro (17-inch 2.4GHz)
- MacBook Pro (15-inch Late 2007)
- MacBook Pro (17-inch Late 2007)
- MacBook Pro (15-inch Early 2008)
- MacBook Pro (17-inch Early 2008)
- MacBook Pro (15-inch Glossy)
- MacBook Pro (17-inch Late 2008)
- MacBook Pro (15-inch Late 2008)
- MacBook Pro (17-inch Early 2009)
- MacBook Pro (13-inch Mid 2009)
- MacBook Pro (15-inch Mid 2009)

- MacBook Pro (15-inch Mid 2009, 2.53 GHz)
- MacBook Pro (17-inch Mid 2009)
- MacBook Pro (17-inch Mid 2010)
- MacBook Pro (15-inch Mid 2010)
- MacBook Pro (13-inch Mid 2010)

Documentation

Here are the MacBook Pro service manuals and technician guides.

Manual/Tech Guide	Models Covered
MacBook Pro	• MacBook Pro
MacBook Pro (17-inch)	• MacBook Pro (17-inch) • MacBook Pro (17-inch Core 2 Duo) • MacBook Pro (17-inch 2.4GHz) • MacBook Pro (17-inch Late 2007 CTO) • MacBook Pro (17-inch Early 2008) • MacBook Pro (17-inch Late 2008)
MacBook Pro (15-inch Core 2 Duo)	• MacBook Pro (15-inch Core 2 Duo)
MacBook Pro (15-inch 2.4/2.2GHz)	• MacBook Pro (15-inch 2.4/2.2GHz)
MacBook Pro (15-inch Early 2008)	• MacBook Pro (15-inch Early 2008)
MacBook Pro (15-inch Late 2008)	• MacBook Pro (15-inch Late 2008)
MacBook Pro (17-inch Early 2009)	• MacBook Pro (17-inch Early 2009) • MacBook Pro (17-inch Mid 2009)
MacBook Pro (13-inch Mid 2009)	• MacBook Pro (13-inch Mid 2009)
MacBook Pro (15-inch Mid 2009)	• MacBook Pro (15-inch Mid 2009)
MacBook Pro (15-inch, 2.53 GHz, Mid 2009)	• MacBook Pro (15-inch, 2.53 GHz, Mid 2009)

MacBook Pro (17-inch Mid 2009)	• MacBook Pro (17-inch Mid 2009)
MacBook Pro (17-inch Mid 2010)	• MacBook Pro (17-inch Mid 2010)
MacBook Pro (15-inch Mid 2010)	• MacBook Pro (15-inch Mid 2010)
MacBook Pro (13-inch Mid 2010)	• MacBook Pro (13-inch Mid 2010)

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Next: Course Exercise

Course Exercise

Open this page separately and keep it open while you review the course.

As you go through the course answer the following questions.

---

1. What is the maximum amount of memory you can install in a MacBook Pro (Core 2 Duo)?

   A. 1 GB
   B. 1.5 GB
   C. 2 GB
   D. 2.5 GB
   E. 3 GB

2. Where is the MacBook Pro (17-inch) serial number located?

   A. The top of the battery bay
   B. The bottom of the battery bay
   C. On the bottom of the main battery
   D. Underneath the illuminated keyboard

3. What type of battery is used in the MacBook Pro (17-inch)?

   A. Lead acid
   B. Lithium ion
   C. Di-lithium ion
   D. Lithium polymer

4. A customer complains that her MacBook Pro will not start up unless it is plugged in. What is the first question you should ask her?

5. A customer complains that their MacBook Pro is running too hot. What should you first ask this person?

6. Using the MacBook Pro service manual, locate the position of the power button pads on the logic board.

7. A customer states that the display hinge on his MacBook Pro (17-inch) will not stay open when the display is partially raised. How do you respond?

8. What are the recommended tools for cleaning a MagSafe connector?

9. What is the first step you should perform before doing any work inside the MacBook Pro (13-inch, Mid 2009)?

   A. Remove the top case
   B. Remove the main battery
   C. Disconnect the main battery
   D. Remove any installed memory
   E. Remove the internal hard drive

10. In the MacBook (13-inch Mid 2009), which of the following can be used in the SD card slot with the proper adapter? Select all that apply:

    A. miniSD
    B. microSD
    C. XD Card
    D. Memory Stick™ ®
    E. CompactFlash™ Card

11. The service fixture is required when removing the _____ in the MacBook Pro (15-inch, Mid 2009). Select all that apply:

    A. Heat sink
    B. Hard drive
    C. Logic board
    D. Left fan
    E. Optical drive

Next: Significant Features

Significant Features

- MagSafe Connectors
- Target Disk Mode and MacBook Pros
- Battery End of Life
- Processor Soldered to Logic Board
- Resources

MagSafe Connectors

The MacBook Pro 85-Watt power adapter with MagSafe connector uses a magnetic connection instead of a physical plug. This means that tripping over a power cord won't send your MacBook Pro flying off the table or desk; the cord simply breaks cleanly away, without damage to either the cord or the computer.

There are a number of service issues for such connectors. Your best resource for learning about these issues is support article TS1713 "Apple Portables: Troubleshooting MagSafe adapters".

Review this article before continuing.

MacBook Pro in Target Disk Mode

If you attempt to mount an Intel-based MacBook Pro in Target Disk Mode on a Mac running Mac OS X 10.3.9 or earlier, you'll see an alert message that says "You have inserted a disk containing no volumes that Mac OS X can read."

The computer you are mounting to must be running Mac OS X 10.4 or later for Target Disk Mode to work.

Battery End of Life

When a lithium polymer battery reaches its end of life, the battery simply ceases function. There is no downward ramp in performance. This means that any battery issue should prompt questions as to how long the battery has been used.

More information about this topic is found at Battery Replacement.

Processor Soldered to Logic Board

The processors in the MacBook Pro series are soldered to the logic board and are considered part of the main logic board assembly for troubleshooting and servicing purposes.

Resources

Please access and review the following articles.

- Apple Notebooks
- HT1490 - "Apple Portables: Calibrating your computer's battery for best performance"
- HT1446 - "Apple Portables: Tips for maximizing your battery charge"

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Next: Product Differences

Product Differences

- Differences Overview

Differences Overview

Here you see how MacBook Pro computers differ in I/O ports, power adapter, and card slot.

Model	FireWire 400	FireWire 800	USB 2.0 Ports	Power Adapter	Card Slot
MacBook Pro	1	0	2	85W Magsafe	ExpressCard/34
MacBook Pro (17-Inch)	1	1	3	85W Magsafe	ExpressCard/34
MacBook Pro (15-inch Core 2 Duo)	1	1	2	85W Magsafe	ExpressCard/34
MacBook Pro (15-inch 2.4/2.2GHz)	1	1	2	85W Magsafe	ExpressCard/34
Macbook Pro (15-inch Early 2008)	1	1	2	85W Magsafe	ExpressCard/34
Macbook Pro (17-inch Early 2008)	1	1	3	85W Magsafe	ExpressCard/34
Macbook Pro (15-inch Late 2008)	0	1	2	85W Magsafe	ExpressCard/34
Macbook Pro (17-inch Late 2008)	1	1	3	85W Magsafe	ExpressCard/34
Macbook Pro (15-inch Mid	0	1	2	60W Magsafe	Secure Digital (SD)

2009)					
Macbook Pro (13-inch Mid 2009)	0	1	2	60W Magsafe	Secure Digital (SD)
MacBook Pro (15-inch Mid 2009)	0	1	2	85W Magsafe	Secure Digital (SD)
MacBook Pro (15-inch Mid 2009 2.53 Ghz)	0	1	2	60W Magsafe	Secure Digital (SD)
MacBook Pro (17-inch Mid 2009)	0	1	3	85W Magsafe	ExpressCard/34
MacBook Pro (17-inch Mid 2010)	0	1	3	85W Magsafe	ExpressCard/34
MacBook Pro (15-inch Mid 2010)	0	1	2	85W Magsafe	Secure Digital (SD)
MacBook Pro (13-inch Mid 2010)	0	1	2	60W Magsafe	Secure Digital (SD)

Here are the differences in hard drive capacity, CPU, video, and display.

Model	**Hard Drive**	**CPU**	**Video**	**Display**
MacBook Pro	80GB, 100GB, 100GB@7200rpm	Intel Core Duo	ATI Mobility Radeon X1600	Matte TFT
MacBook Pro (17-Inch)	120GB 5400-rpm or 100GB 7200-rpm	Intel Core Duo	ATI Mobility Radeon X1600	Matte or Glossy TFT
MacBook Pro (15-inch Core 2 Duo)	120 or 160GB 5400-rpm or 200GB 4200-rpm	Intel Core 2 Duo	ATI Mobility Radeon X1600	Matte or Glossy TFT
MacBook Pro (15-inch 2.4/2.2GHz)	200GB (4200-rpm) 120, 160, or 250GB (5400-rpm) 160 or 200GB (7200-rpm)	Intel Core 2 Duo	NVIDIA GeForce 8600M GT	LED backlit TFT, Optional Glossy
Macbook	200 or 250GB (5400-			

Pro (15-inch Early 2008)	rpm), 200GB (7200-rpm)	Intel Core 2 Duo	NVIDIA GeForce 8600M GT	LED backlit TFT, Optional Glossy
Macbook Pro (17-inch Early 2008)	250GB (5400-rpm), 200GB (7200-rpm), or 300GB (4200-rpm)	Intel Core 2 Duo	NVIDIA GeForce 8600M GT	LED backlit TFT, Optional Glossy
Macbook Pro (15-inch Late 2008)	250 or 320GB (5400-rpm SATA), 250 or 320GB (7200-rpm SATA), or 128 or 256GB (SSD)	Intel Core 2 Duo	NVIDIA GeForce 9600M GT and GeForce 9400M	LED backlit Glossy
Macbook Pro (17-inch Late 2008)	320GB (5400- or 7200-rpm SATA) or 128GB (SSD)	Intel Core 2 Duo	NVIDIA GeForce 8600M GT	LED backlit Glossy. Optional anti-glare
Macbook Pro (15-inch Mid 2009)	250, 320, or 500GB (5400-rpm SATA), 320 or 500GB (7200-rpm SATA), or 128 or 256GB (SSD)	Intel Core 2 Duo	NVIDIA GeForce 9400M	LED backlit Glossy. Optional anti-glare
Macbook Pro (13-inch Mid 2009)	160, 250, 320, or 500GB (5400-rpm SATA) or 128 or 256GB (SSD)	Intel Core 2 Duo	NVIDIA GeForce 9400M	LED backlit Glossy
MacBook Pro (15-inch Mid 2009)	320GB Serial ATA; 5400 rpm or 500GB Serial ATA; 5400 rpm	Intel Core 2 Duo	NVIDIA GeForce 9600M NVIDIA GeForce 9400M	LED backlit Glossy
MacBook Pro (15-inch Mid 2009 2.53 Ghz)	250GB Serial ATA; 5400 rpm	Intel Core 2 Duo	NVIDIA GeForce 9400M	LED backlit Glossy
MacBook Pro (17-inch Mid 2009)	500GB Serial ATA; 5400 rpm	Intel Core 2 Duo	NVIDIA GeForce 9600M	LED backlit Glossy
MacBook Pro (17-inch Mid 2010)	500GB Serial ATA; 5400 rpm	Intel Core i5	Intel HD Graphics5; NVIDIA GeForce GT 330M	LED backlit Glossy
MacBook Pro (15-inch Mid 2010)	320GB Serial ATA; 5400 rpm or 500GB Serial ATA; 5400 rpm	Intel Core i5 or Intel Core i7	Intel HD Graphics5; NVIDIA GeForce GT 330M	LED backlit Glossy
MacBook Pro (13-inch Mid 2010)	250GB Serial ATA; 5400 rpm or 320GB Serial ATA; 5400 rpm	Intel Core 2 Duo	NVIDIA GeForce 320M	LED backlit Glossy

Next: Troubleshooting Issues

Troubleshooting Issues

- Troubleshooting Issues

Troubleshooting Issues

- **Processor** is soldered to the logic board. It is not upgradeable.
- Keeping the **MagSafe** connectors clean is very important. Also, be sure to inspect for bent pins.
- If a MacBook Pro is started into **Target Disk Mode**, it will only show up on the Desktop of a Mac computer running Mac OS X 10.4 or later.
- If you are **formatting a MacBook Pro drive via Target Disk Mode** use an Intel-based Mac to do the formatting.
- Only **34mm wide ExpressCard modules** are compatible with the MacBook Pro models that accept ExpressCards.
- **Lithium Polymer Batteries** - Will go completely dead when they reach end of life.
- **RAM** needs to be fully seated for correct performance. No video is a symptom of incompletely seated RAM. The service manual has details of how you can fully seat RAM.
- **For MacBook Pro (15-inch and 17-inch Early 2008) models** - Unlike versions of ASD previously available for earlier MacBook Pro models, these models use **ASD version 3S121 or later**, which requires installation onto an external USB hard drive.

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Next: Tools

Tools

- Issues with Tools
- Required Tools

Issues with Tools

Using Correct Tools

MacBook Pro computers contain small parts that are held together with a wide variety of small screws and bolts. One of the most common mistakes in working with MacBook Pro computers is to use the wrong size or type of tool to repair the unit.

All too often, the wrong tool means that screws are worn or screw attachment points are stripped.

Apple service manuals contain procedures that describe the tools needed to replace parts and perform the repair. These procedures work as long as you use the recommended tools as a part of the recommended procedure.

NOTE: Special tools are required for removing the battery from the MacBook (13-inch Mid 2009) and the MacBook (15-inch Mid 2009).

In addition, a logic board fixture is required for working with the logic board in the MacBook Pro (15-inch Mid 2009).

Details on these tools are located in the Repair Issues section of this course.

Keeping Track of Parts

One of the recommended tools for any repair is a tray with numerous compartments. If you do not use some means of keeping track of the screws and other small parts that you remove from a MacBook, you will have a very difficult time reassembling the computer.

A partitioned tray along with the Screw Matrix in the Service Manual will save you a great deal of time and ensure that a completed repair has not added problems to the computer.

Issues with Metal tools

Be very careful whenever using metal tools anywhere around a MacBook Pro. It's very easy to scratch outer surfaces with metal tools.

Remember to only use plastic pry tools to carefully unlatch cable connectors and release catches on plastic case parts. Apple recommends the Nylon Probe Tool. This is a black plastic pry tool that should not damage plastics or scratch metals if used carefully.

More details on tools for computer repair are found in the Hardware Tools course.

Required Tools

You need the following tools to work on MacBook Pro computers.

- Clean non-marring work surface
- ESD wrist strap and mat
- Multi-compartment screw tray (such as a plastic ice cube tray)
- #0 Phillips screwdriver (magnetized)
- #1 Phillips screwdriver (magnetized)
- Torx T6 screwdriver (magnetized)
- 4 mm socket wrench
- Black stick (nylon probe 922-5065) or other non-conductive nylon or plastic flat-blade tool
- Razor knife
- Needle-point metal probe
- Needlenose pliers
- Tweezers
- Kapton tape (922-1731) (0.5-inch x 12-yard roll)
- Thermal grease (922-7144)
- Gasket kit (varies with model)
- Alcohol pads
- Fine-point felt-tip permanent marker
- Putty knife tool (922-6761)
- Apple Pro keyboard and mouse (for troubleshooting)

Next: Repair Issues

Take Apart Issues

- Take Apart Issues
- MacBook Pro (15-inch Mid 2009) Issues
- MacBook Pro (13-inch Mid 2009) Issues

Take Apart Issues

The following tips are taken from the MacBook Pro service manuals and other sources. If you have any questions regarding any of these tips, consult the manual before proceeding with a repair.

- Serial number and Ethernet ID are located in the battery bay

- Never double up layers of Kapton tape. Clear off old tape before applying new tape. Doubling up layers can lead to clearance issues when you reassemble the system.

- When removing memory from a MacBook Pro, you must remove memory from the top slot before removing memory from the bottom slot.

- When removing top case, be careful not to break the keyboard flex cable when lifting the top case.

- When replacing top case, do NOT attempt to put screws into the DVI port screw holes. This is a common mistake and can damage the case.
- When replacing keyboards, please note that the keyboard flex cables are quite delicate.
- Antenna cables for AirPort Extreme Card are color coded to avoid incorrectly connected antennas.
- When replacing thermal sensors be sure to put the sensor back in the same exact place you took it from. Marking the location before removal with a marker is helpful.
- Removing tape from Hard Drive must be done carefully because a torn drive label voids the hard drive warranty.
- The rubber grommets and screws on a defective hard drive must be transferred to the replacement hard drive.
- Optical drives in the MacBook Pro models are quite delicate. Refer to the service manual for handling instructions.
- JST Connectors were introduced with the MacBook Pro (2.4/2.2 GHz) models. You should use a narrow probe to open these connectors. Review the service manual procedures before attempting to take apart these systems for the first time.
- When replacing the Logic Board, tape the Thermal Sensor Cable to Display Assembly to avoid trapping it.
- Do not flex the logic board at any time. This can crack solder joints - particularly at the narrow neck of the fan cutout.
- Do not hold the Logic Board horizontally when replacing it. Holding it horizontally can crack the solder joints.
- You must clean off thermal grease from the heatsink when replacing the Logic Board.
- Each application of thermal grease to a heatsink contact point uses one-third of a syringe-full. Mark off thirds on thermal grease syringe before applying the grease.
- When replacing the Logic Board, follow the sequencing of screw replacement described in the service manual.
- On the MacBook Pro (15-inch 2.4/2.2 GHz) models The Left I/O Board is new and has EMI mylar film on the bottom. Do NOT remove the film.
- When replacing the Display Assembly, verify AirPort Extreme, camera, trackpad, keyboard, and keyboard backlight cables are connected. It is easy to forget one of these connectors when replacing the MLB.
- Be careful not to allow screws and small metal parts near the MagSafe Connector.
- Keep cards with magnetic stripes clear of the MagSafe Connector. Otherwise there is risk of data

corruption on the card.

- The MacBook Pro (Early 2008) keyboard is not interchangeable with any previous models, including the original MacBook Pro, Core 2 Duo and 2.4/2.2GHz. If replacing the keyboard, verify that the correct replacement keyboard and/or top case is ordered.

MacBook Pro (15-inch Mid 2009) Issues

Internal Battery

Summary: MacBook Pro (15-inch, Mid 2009) contains an internal-only battery that is serviceable by Apple-authorized service providers only. Tamper-proof screws are employed to prevent customers from attempting to remove it. The battery must be disconnected when performing any internal service on this product, to avoid damage to the battery and/or the internal components. Battery removal is only required when replacing the following components:

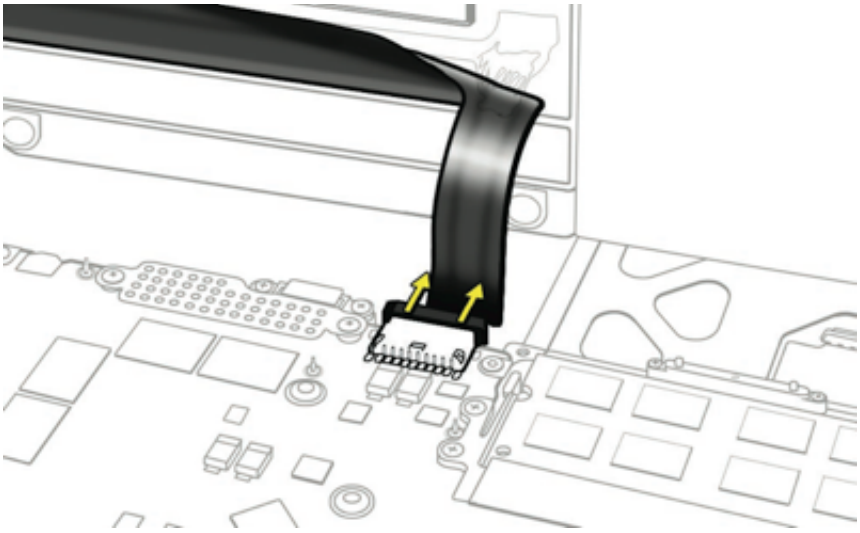
- battery
- trackpad
- left speaker
- microphone
- MagSafe board
- center bracket
- logic board
- top case

In most other repairs, the battery cable must be disconnected, but the battery and its screws remain in place.

Note: Unlike previous MacBook Pro models, there is no access door on the bottom of this model. Rather, the entire bottom case is removed to gain access to the battery and other internal components.

WARNING: Because the battery is internal and connected to the logic board by a cable, it MUST BE DISCONNECTED before performing service procedures. If you fail to do so, live current from the battery will short circuit the components and render the logic board and/or LVDS cable unusable.

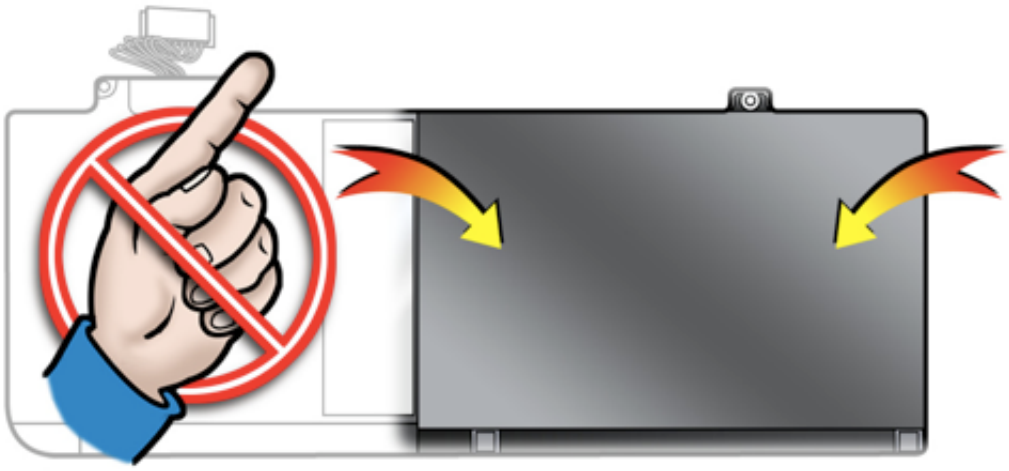
Tip: Every time you remove the bottom case, disconnect the battery cable from the logic board before doing anything else inside.



Disconnecting MacBook Pro (15-inch, Mid 2009) Battery

WARNING: Underside of battery has a nonconductive cover.

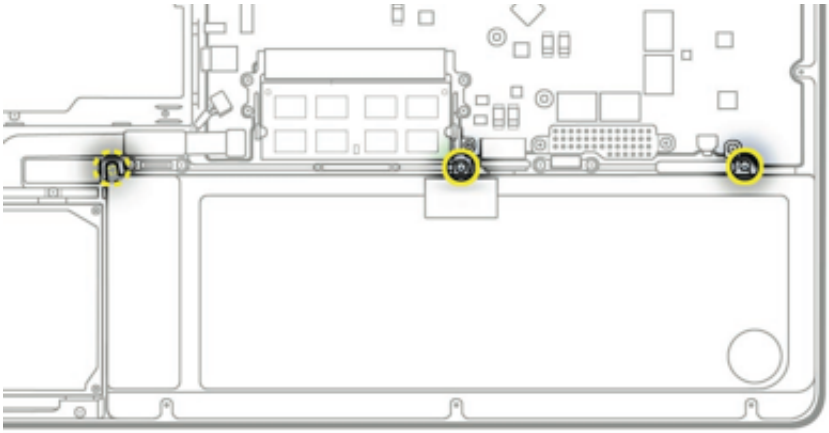
Tip: Whenever you handle the battery, hold the battery carefully by its edges only. Do not puncture or press on battery. If mylar covering battery is punctured, do not re-use battery. Do not drop the battery. If setting battery aside, make sure surface is clean and free of dust, dirt, screws, etc.



Battery Removal Tool

Tip: To remove the security screws holding the battery in place, you will need a special tool, the Torx Plus Tamper 6 screwdriver, Apple part number 922-9101, available through GSX.

Torx Plus Tamper 6
Screwdriver 922-9101
and Screw Head (enlarged)



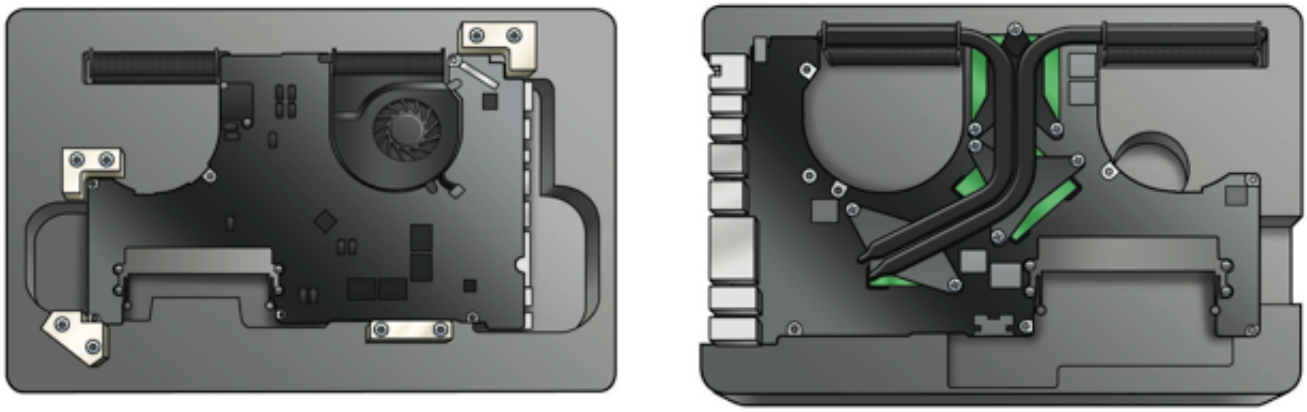
Location of Battery Screws

Service Fixture

Summary: Use the service fixture (922-9102) to provide support to the logic board whenever removing and replacing the left fan and heat sink in MacBook Pro (15-inch, Mid 2009). Failure to use the service fixture will flex the logic board and strain components on it, which could damage the logic board.

Note: The fixture is not used with the MacBook Pro (15-inch, 2.53 GHz, Mid 2009). The logic board on that product is a different shape and doesn't require the fixture.

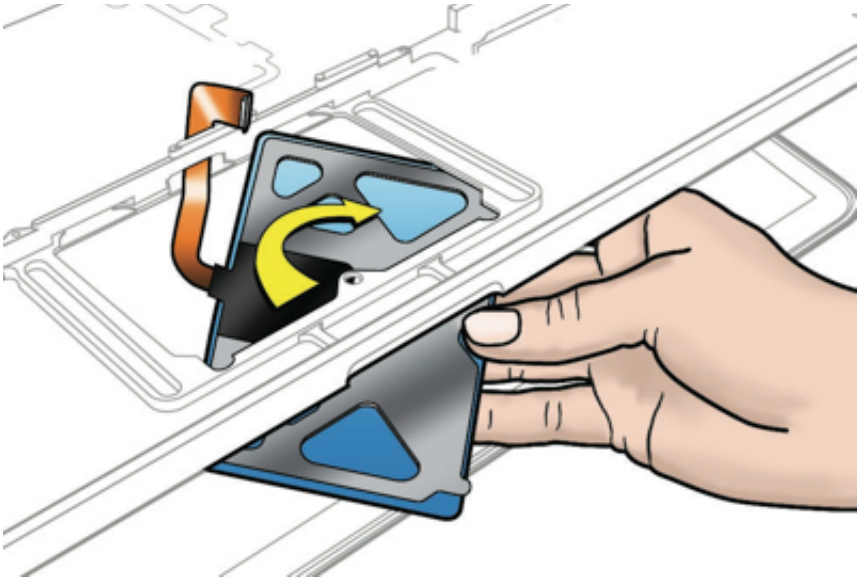
Tip: The fixture is two-sided; one side is for fan removal and installation and the other side is for heat sink removal and installation. The graphics below demonstrate the logic board positioned on each side of the fixture.



MacBook Pro (15-inch, Mid 2009) Service Fixture – 922-9102
Fan Installation and Removal Side Heat Sink Installation and Removal Side

Trackpad Replacement Procedure

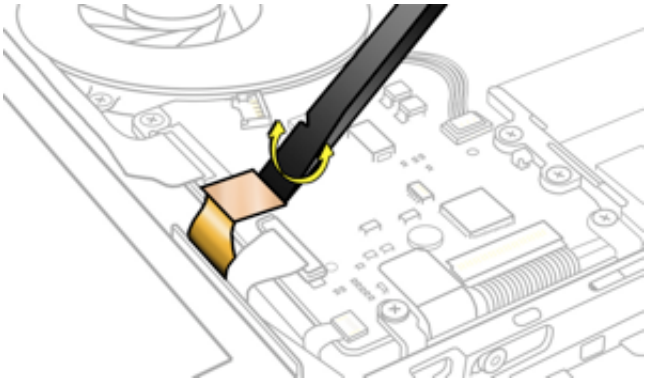
Summary: The MacBook Pro (15-inch, Mid 2009) Apple Technician Guide contains new, detailed replacement instructions for the built-in trackpad.



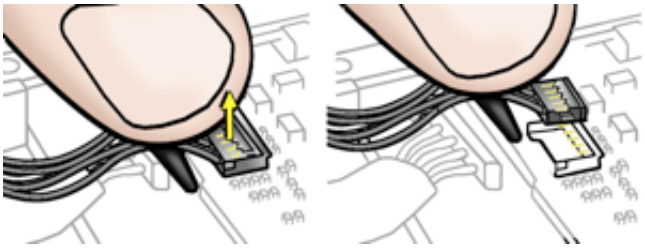
Tip: Technicians should refer to the information located in the MacBook Pro (15-inch, Mid 2009) Apple Technician Guide to properly remove and replace the trackpad.

Internal Cables and Connectors

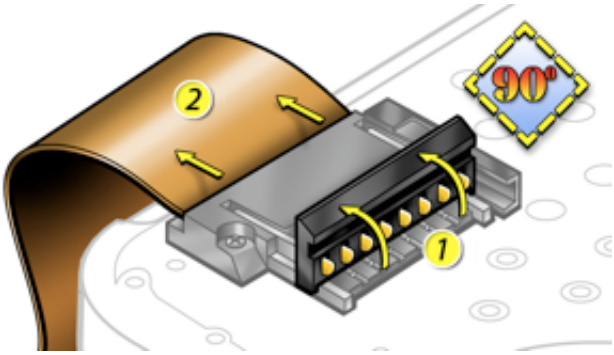
Summary: MacBook Pro (15-inch, Mid 2009) contains several internal cable and connector types. The Apple Technician Guide has been updated to provide more information about the types and handling requirements of the internal cables and connectors you will encounter during disassembly of this product. Here are some examples of the various connector types:



Low-Profile Solid Platform Flex
(Optical Drive Flex Cable)



Vertical Insertion (JST)
(Fan Cables)



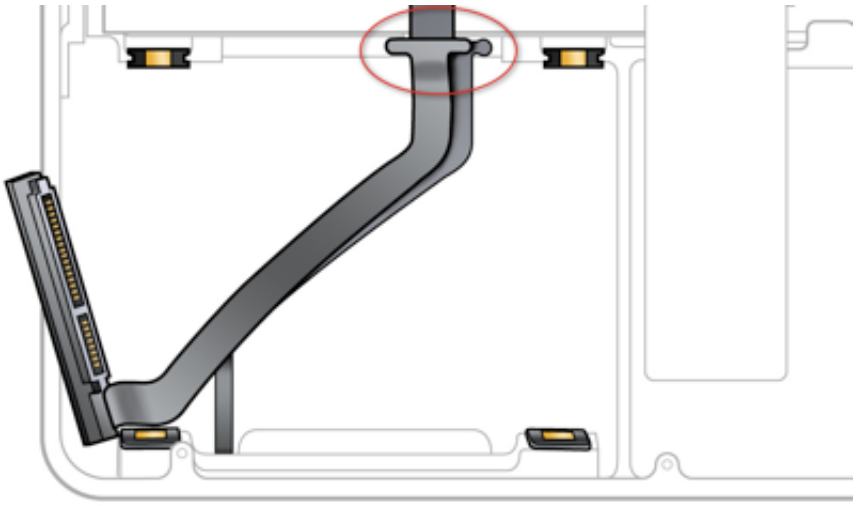
Locking Lever
(Keyboard Flex Cable)

Thin, Multi-Pin Horizontal Insert
(LVDS, Camera Cable)

Tip: Technicians should always use the information located in the MacBook Pro (15-inch, Mid 2009) Apple Technician Guide to properly handle all cables and connectors during disassembly, and to ensure that all internal cables are securely seated and properly connected during reassembly.

Hard Drive Flex Cable Caution

Summary: The MacBook Pro (15-inch, Mid 2009) and MacBook Pro (15-inch, 2.53 GHz, Mid 2009) hard drive and IR/sleep flex cable is fastened to the internal frame with two screws. Technicians should be very careful when connecting or disconnecting a hard drive and this cable, to avoid tearing this flex cable at the point where it is fastened to the internal frame.



Tip: Technicians should refer to the information located in the MacBook Pro (15-inch, Mid 2009) Apple Technician Guide for more information about this procedure.

MacBook Pro (13-inch Mid 2009) Issues

Main Battery Removal and Replacement

Summary: MacBook Pro (13-inch, Mid 2009) contains an internal-only battery that is serviceable by Apple-authorized service providers only. Tamper-proof screws are employed to prevent customers from attempting to remove it. The battery must be disconnected when performing any internal service on this product, to avoid damage to the battery and/or the internal components. Battery removal is only required when replacing the following components:

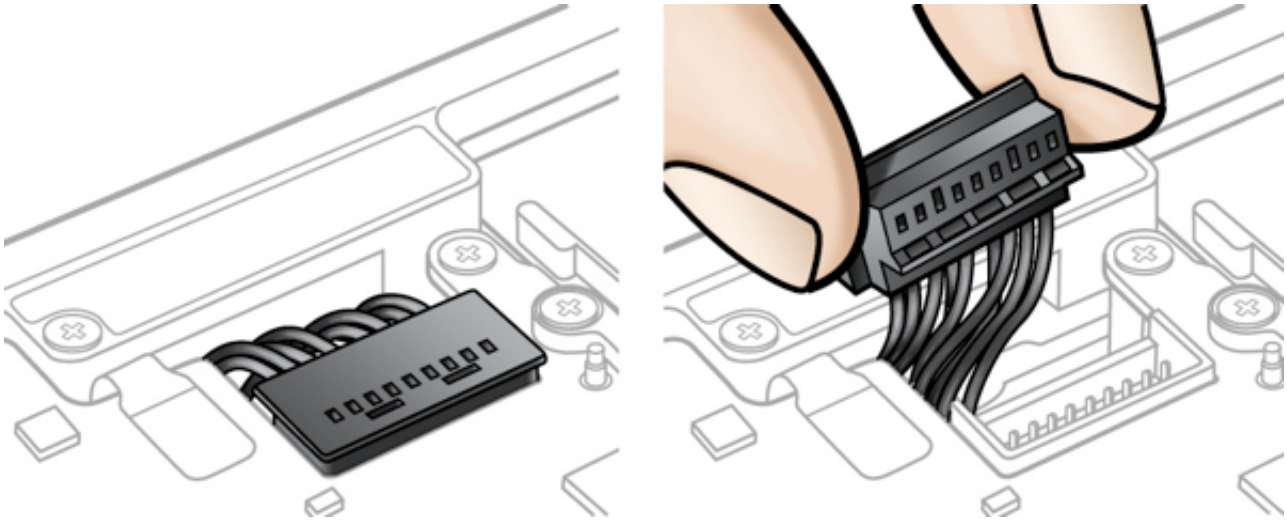
- battery
- battery indicator light
- trackpad
- top case

In most other repairs, the battery cable must be disconnected, but the battery and its screws remain in place.

Note: Unlike previous MacBook models, there is no access door on the bottom of this model. Rather, the entire bottom case is removed to gain access to the battery and other internal components.

WARNING: Because the battery is internal and connected to the logic board by a cable, it MUST BE DISCONNECTED before performing service procedures. If you fail to do so, live current from the battery will short circuit the components and render the logic board and/or LVDS cable unusable.

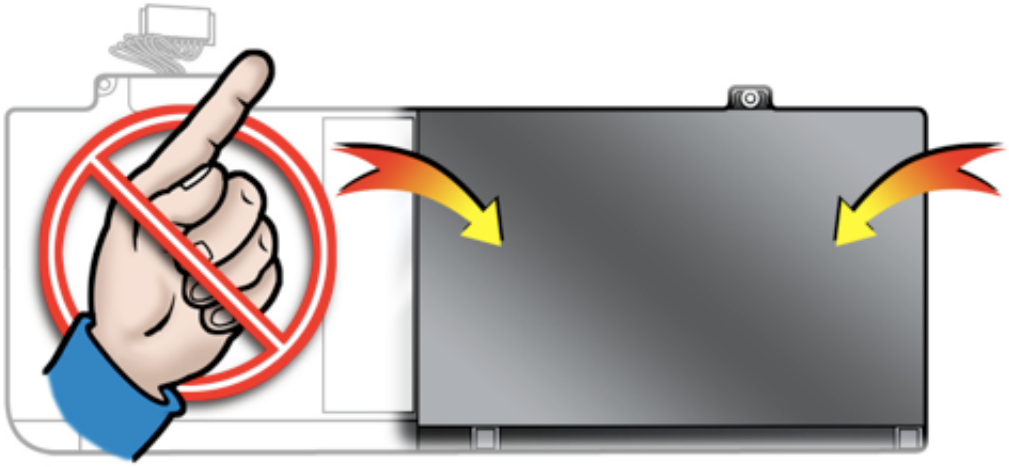
Tip: Every time you remove the bottom case, disconnect the battery cable from the logic board before doing anything else inside.



Disconnecting MacBook Pro (13-inch, Mid 2009) Battery

WARNING: Underside of battery has a nonconductive cover.

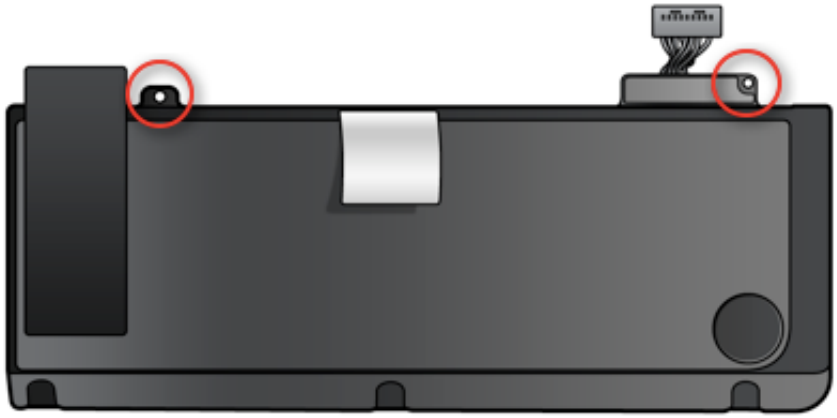
Tip: Whenever you handle the battery, hold the battery carefully by its edges only. Do not puncture or press on battery. If mylar covering battery is punctured, do not re-use battery. Do not drop the battery. If setting battery aside, make sure surface is clean and free of dust, dirt, screws, etc.



Battery Removal Tool

Tip: To remove the security screws holding the battery in place, you will need a special tool, a tri-lobe #0 screwdriver, Apple part number 922-8991, available through GSX.

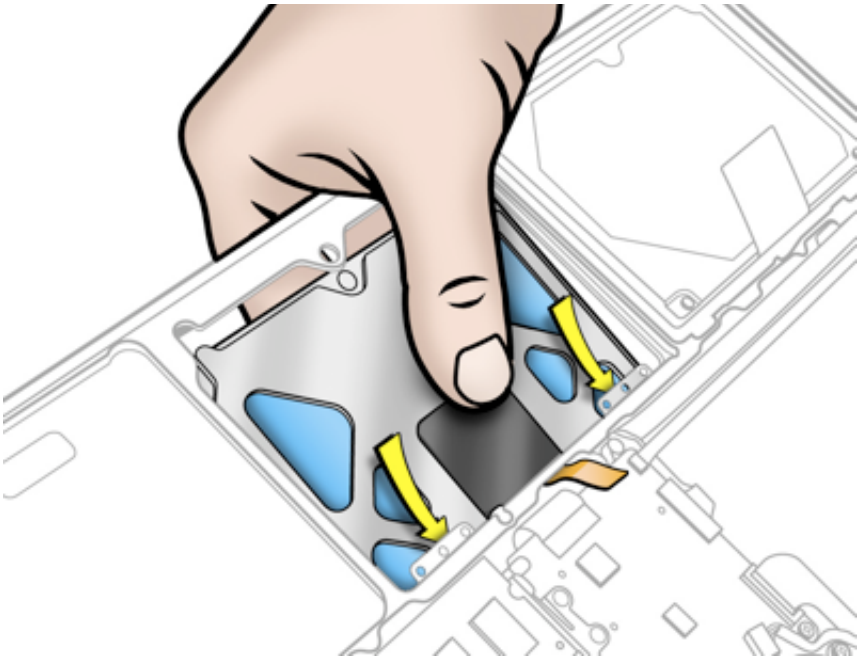
Tri-lobe #0 Screwdriver
922-8991
and Screw Head (enlarged)



Location of Battery Screws

Trackpad Replacement Procedure

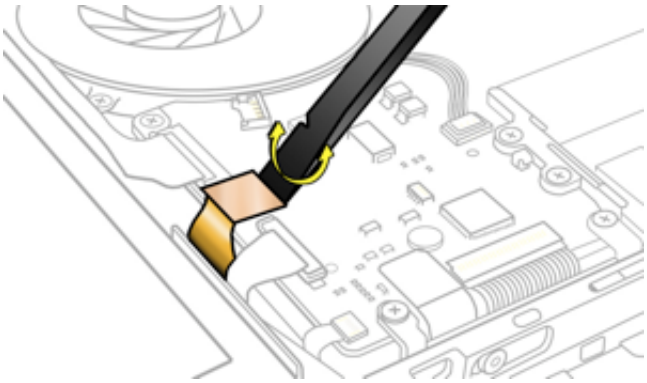
Summary: The MacBook Pro (13-inch, Mid 2009) Apple Technician Guide contains new, detailed replacement instructions for the built-in trackpad.



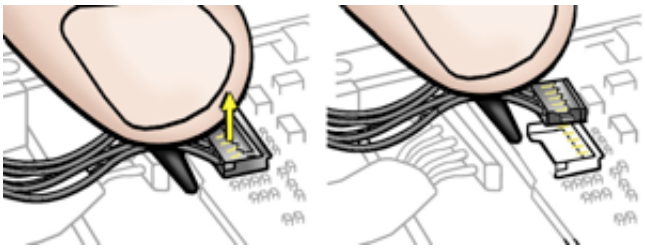
Tip: Technicians should refer to the information located in the MacBook Pro (13-inch, Mid 2009) Apple Technician Guide to properly remove and replace the trackpad.

Internal Cables and Connectors

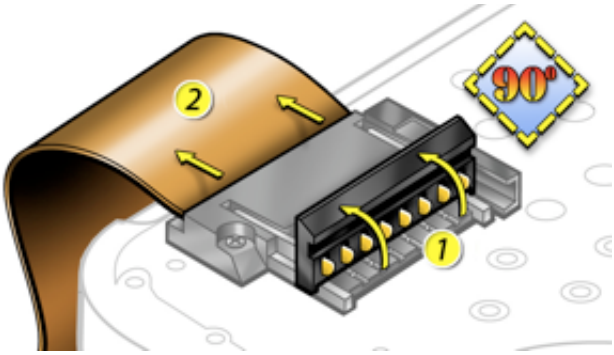
Summary: MacBook Pro (13-inch, Mid 2009) contains several internal cable and connector types. The Apple Technician Guide has been updated to provide more information about the types and handling requirements of the internal cables and connectors you will encounter during disassembly of this product. Here are some examples of the various connector types:



Low-Profile Solid Platform Flex
(Optical Drive Flex Cable)



Vertical Insertion (JST)
(Fan Cables)



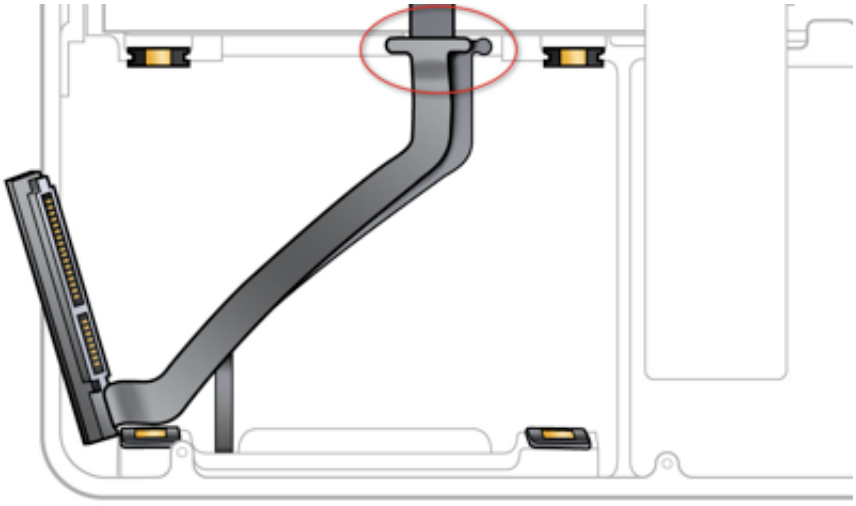
Locking Lever
(Keyboard Flex Cable)

Thin, Multi-Pin Horizontal Insert
(LVDS, Camera Cable)

Tip: Technicians should always use the information located in the MacBook Pro (13-inch, Mid 2009) Apple Technician Guide to properly handle all cables and connectors during disassembly, and to ensure that all internal cables are securely seated and properly connected during reassembly.

Hard Drive Flex Cable Caution

Summary: The MacBook Pro (13-inch, Mid 2009) hard drive and IR/sleep flex cable is fastened to the internal frame with two screws. Technicians should be very careful when connecting or disconnecting a hard drive and this cable, to avoid tearing this flex cable at the point where it is fastened to the internal frame.



Tip: Technicians should refer to the information located in the MacBook Pro (13-inch, Mid 2009) Apple Technician Guide for more information about this procedure.

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